
Narrowband magnetic particle imaging.

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Public Summary:

The magnetic particle imaging (MPI) method directly images the magnetization of super-paramagnetic iron oxide (SPIO) nanoparticles, which are contrast agents commonly used in magnetic resonance imaging (MRI). MPI, as originally envisioned, requires a high-bandwidth receiver coil and preamplifier, which are difficult to optimally noise match. This paper introduces Narrowband MPI, which dramatically reduces bandwidth requirements and increases the signal-to-noise ratio for a fixed specific absorption rate. We employ a two-tone excitation (called intermodulation) that can be tailored for a high-Q, narrowband receiver coil. We then demonstrate a new MPI instrument capable of full 3-D tomographic imaging of SPIO particles by imaging acrylic and tissue phantoms.

Scientific Abstract:

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